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KNOWLEDGE MANAGEMENT SYSTEMS, ABSORPTIVE CAPACITY, AND INNOVATION SUCCESS

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Abstract

Innovation is considered a major driving force for the prosperity of firms and entire economies. Research suggests that a firm's capacity to acquire and utilize relevant knowledge from internal and external sources, i.e. its absorptive capacity (ACAP), is decisive for innovation success. But what is the role of Knowledge Management Systems (KMS) for a firm's ACAP and innovativeness? Surprisingly, despite lots of mature research on both, ACAP and KMS, there is a gap linking the two. This paper hence asks: What is the effect of knowledge management systems usage on absorptive capacity and innovation success? Responding to recent findings in the management and organizational sciences we develop a theoretical model that links the availability and usage of KMS with a firm's ACAP and its organizational knowledge to explain innovation success.

An empirical evaluation using data from 224 manufacturing firms shows that a firm's KMS strongly contributes to its ACAP and catalyzes the innovation process. The results suggest that organizational knowledge is important for innovation success and that successful KMS work through enhancing particular facets of ACAP.

Keywords: Knowledge Management Systems (KMS), Absorptive Capacity, Innovation Process, PLS.

1 Introduction

For decades, literature has consistently shown that innovation is an important driving force for the prosperity of firms and entire economies (Schumpeter, 1934). Innovations, defined "as the successful implementation of creative ideas, tasks, or procedures" (Cummings et al., 2003, p. 297), have been investigated in many studies. While countless studies in innovation research have identified over 100 factors that might influence innovation success, research results consistently indicate that a firm's knowledge and capabilities are the main driving force. Consequently, seeing the exchange and combination of knowledge at the core of innovative activities has become a central tenet of innovation theories. As the ability of firms to innovate, which we refer to as innovativeness, depends on the absorption and combination of new and existing knowledge and its exploitation, a key challenge is to disclose how a firm can acquire and utilize relevant knowledge. In this context, absorptive capacity (ACAP), dealing with absorbing and applying knowledge to commercial ends, was found to be an important factor for organizational learning and innovation (Cohen et al., 1990). Recently, Zahra and George (2002) have re-conceptualized ACAP and distinguished it into one part dealing with acquiring and assimilating knowledge (potential absorptive capacity - PACAP) and one dealing with transforming and exploiting knowledge (realized absorptive capacity – RACAP).

Extant literature has investigated antecedents or drivers of absorptive capacity. Some studies also investigate firm-internal antecedents of ACAP such as organizational mechanisms (Jansen et al., 2005), organizational form and combinative capabilities (Van den Bosch et al., 1999) and internal information provision (Lenox et al., 2004). One role of knowledge management is to strengthen those capabilities that allow for sharing and utilizing the firm's knowledge. As we argue in the following, ACAP "depends on the organization's ability to share knowledge and communicate internally" (Lane et al., 2006, p. 838) and thus is an outcome of a firm's knowledge management activities. Interestingly, though, the impact of a firm's knowledge management systems (KMS) on ACAP and innovation success is severely under-researched and untested. We extend prior research by explicitly investigating the role of the usage of knowledge management systems as firm-internal driver of absorptive capacity. Further, we specifically scrutinize the role that KMS play for managing organizational knowledge. Our research question hence addresses an interesting knowledge gap in innovation research: *What is the effect of KMS usage on absorptive capacity and innovation success?*

We develop a theoretical model that links the availability and usage of KMS with a firm's absorptive capacity and its organizational knowledge to explain innovation success. The model is quantitatively evaluated using data from 224 firms from the German manufacturing industry. The results show that KMS strongly contribute to PACAP as well as to RACAP and that it is highly important for actively framing and catalyzing the innovation process.

2 Theoretical Foundation

2.1 Knowledge Management and Knowledge Management Systems (KMS)

"Knowledge management refers to identifying and leveraging the collective knowledge in an organization to help the organization compete" and "is purported to increase innovativeness and responsiveness" (Alavi et al., 2001, p. 113). Thus, knowledge management directly contributes to innovativeness and is hence associated with innovation management (Coombs et al., 1998). It can take on different goals and "focus on building and managing knowledge stocks", or focus on "knowledge flow and the processes of creation, sharing, and distribution of knowledge" (compare also Argote et al., 2003b), or "on building core competencies, understanding the strategic advantage of know-how, and creating intellectual capital" (Alavi and Leidner, 2001, p. 110). KMS are "IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and appli-

cation." (Alavi and Leidner, 2001, p. 114) and help firms to identify and leverage knowledge. KMS in form of different tools like document management or knowledge mapping systems were identified as one of the most important innovation management tools (Hidalgo et al., 2008).

2.2 Absorptive Capacity (ACAP)

The absorptive capacity (ACAP) of a firm plays an important role in terms of organizational learning and innovation (Tsai, 2001) as well as for firm performance in general (Lane et al., 2001). The concept of ACAP as introduced by Cohen and Levinthal (1990) was re-conceptualized by Zahra and George (2002) who differentiate ACAP into two components: potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP). PACAP comprises the two abilities of acquiring and assimilating external knowledge. The former is a capability "to identify and acquire externally generated knowledge that is critical to its operations" whereas the latter "refers to the firm's routines and processes that allow it to analyze, process, interpret, and understand the information obtained from external sources" (Zahra and George, 2002, p. 189). The second component, RACAP, comprises the two abilities transformation and exploitation. "Transformation denotes a firm's capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge" (Zahra and George, 2002, p. 190) which includes adding new and deleting old pieces of knowledge as well as the interpretation of this knowledge. The exploitation capability is the ability of a firm to "harvest and incorporate knowledge into its operations" (Zahra and George, 2002, p. 190). New goods or processes are typical outcomes of the exploitation capability (Spender, 1996).

3 Model Development

Our theoretical model deals with the use of KMS and its influence on innovation success and on organizational knowledge mediated by a firm's ACAP. "Organizational knowledge is the set of collective understandings embedded in a firm, which enable it to put its resources to particular uses" (Tsoukas et al., 2001, p. 981). It enables innovation success (Subramaniam et al., 2005) and exhibits an explicit form, such as established standards and practices ("objectified knowledge" (Spender, 1996)), and a tacit form ("collective knowledge" (Spender, 1996)) that is a form of "shared knowledge [that] has been defined as 'routines' by Nelson and Winter (1982)" (Nahapiet et al., 1998, p. 247).

Innovation success is our dependent variable. As mentioned before, Cummings and Kiesler (2003, p. 297) define innovation "as the successful implementation of creative ideas, tasks, or procedures". In our context, an innovation is successful if new products or services are launched. Organizational knowledge, which in our case corresponds to the firm's collective rest on technological knowledge, is the foundation for developing new products and thus contributes to innovation success. Innovation is about exchanging and combining knowledge. Hence knowledge management and particularly the use of KMS play an important role for innovation as well as for the organizational knowledge. This effect of KMS usage is mediated by RACAP concerning innovation success and by PACAP concerning the knowledge stock of an organization. Following, the propositions will be derived.

3.1 Organizational knowledge as driver of innovation success

Organizational knowledge as an antecedent of innovation has been empirically analyzed by several studies (e.g. Jansen et al., 2005). E.g. Bell and Zaheer (2007) have shown that externally acquired knowledge from customers and suppliers is positively affiliated with innovations. Organizational knowledge has been shown to be important for "innovation generating organizations" (Damanpour et al., 2006), and as basis for learning processes leading to innovation (Lichtenthaler, 2009). Superior access to and the associated integration of a range of specialized knowledge builds the basis for the creation of innovations by transforming and exploiting this knowledge. "Increased knowledge can relate to

the introduction of a novel manifestation resulting in an innovation" (Chen et al., 2005). We propose *Hypothesis 1 (H1): Organizational knowledge positively influences innovation success.*

3.2 KMS as antecedent for organizational knowledge

Knowledge management can be subdivided into various knowledge management processes. Alavi and Leidner (2001, p. 114) consider the four basic knowledge management "processes of creating, storing/retrieving, transferring, and applying knowledge" which contribute to enhancing organizational knowledge that is based on combination and exchange of knowledge (Kogut et al., 1992). Combination and exchange of knowledge, in turn, rest on collaborative processes as well as on individual reflection which are necessary for knowledge creation and sharing (Nonaka, 1994).

These processes can be facilitated and supported by the use of KMS in several ways. For example, Argote et al. (2003a; 2003b) and Darr et al. (1995) point out that organizations not only create knowledge but also forget knowledge (e.g. knowledge might be somewhere in the organization but is not present for use). In this respect, KMS, e.g. in form of electronic databases and expert systems, provide the means to store, organize, and retrieve organizational knowledge and thus create what is called organizational memory (e.g. Randall et al., 2001). Providing this functionality, KMS are able to enhance the reuse of stored knowledge and thus contribute to enhancing organizational knowledge.

Another important knowledge management process is knowledge transfer. Within a firm, knowledge is typically distributed across individuals and organizational units and it has to be exchanged to come up with new combinations of knowledge. Knowledge transfer can take on various forms such as face-to-face meetings, training sessions, or email. KMS can support "knowledge transfer by extending the individual's reach beyond the formal communication lines" (Alavi and Leidner, 2001, p. 121).

KMS also support the application of knowledge by facilitating and speeding up the access to knowledge (Alavi et al., 2002; Gold et al., 2001) that might be present as organizational directives (Grant, 1996). Summarizing this discussion, we formulate *Hypothesis 2 (H2): Usage of KMS positively and directly influences organizational knowledge.*

3.3 KMS as Antecedent for innovation success

KMS support the identification of knowledge. "Examples include finding an expert or a recorded source of knowledge using online directories and searching databases; sharing knowledge and working together in virtual teams; access to information on past projects; and learning about customer needs" (Alavi and Leidner, 2001, p. 114). Therefore KMS help in identifying knowledge sources. Similarly, KMS are used to easily find and connect different pieces of information, thereby providing a more complete picture of newly acquired knowledge. Thus, KMS contribute to a more comprehensive understanding of acquired knowledge. During new product development projects, KMS is typically used to inject knowledge learned during development into the KMS and to extract information that helps to find links to existing, eventual complementary, knowledge, e.g. to solve detailed problems during development which are similar to previously solved problems. Summarizing, we formulate *Hypothesis 3 (H3): Usage of KMS positively and directly influences innovation success.*

3.4 The role of PACAP in the knowledge generation process

As discussed in section 2.1 knowledge management and KMS help firms to identify, find (see also Denrell et al., 2004), and leverage knowledge (Alavi and Leidner, 2001). Therefore, KMS facilitate the identification and acquisition of relevant knowledge from internal or external sources by providing means to identify them and by "enhancing the speed, intensity, and directionality of knowledge identification and selection" (Joshi et al., 2010, p. 474). Furthermore, KMS support the assimilation of knowledge by building and organizing a knowledge stock (Joshi et al., 2010) that allows to better pro-

cess and interpret new knowledge in the light of that accumulated knowledge stock. Therefore, we propose *Hypothesis 4a/b (H4a/b): The usage of KMS positively and directly influences the acquisition (H4a) and the assimilation capability (H4b) and thus is an important contributor for gathering knowledge.*

PACAP centers on the capability to acquire and to assimilate knowledge and is based upon "a prolonged process of investment and knowledge accumulation" (Tsai, 2001, p. 998). For acquiring and interpreting as well as for processing knowledge from internal or external sources, both capabilities of PACAP (acquisition and assimilation) are necessary. Unless the knowledge is acquired and, in particular, processed, the firm will not be able to put it into its operations. Therefore, to render an effect and to add knowledge to the firm's knowledge base, knowledge from different sources has to be acquired and to be assimilated. Therefore, we propose *Hypothesis 4c/d (H4c/d):* The *acquisition (H4c) and assimilation capabilities (H4d) of a firm positively and directly influence organizational knowledge*.

Combining hypotheses 4a-d we argue that KMS will increase acquisition and assimilation capabilities by supporting the processing and interpreting of acquired knowledge. PACAP in turns is an important driver for building and enhancing the firm's organizational knowledge. Thus we propose the overall *Hypothesis 4 (H4): PACAP positively mediates the influence of KMS on organizational knowledge.*

3.5 The role of RACAP in the innovation process

The argumentation why KMS are important for RACAP follows the previous argumentation for the relationship between KMS and PACAP. KMS facilitate the transformation capability by supporting the combination of existing knowledge and newly acquired and assimilated knowledge and by providing means to merge, update, share, and synthesize knowledge (Joshi et al., 2010). Moreover, KMS help to implement the newly generated knowledge into the firm's operations to generate new products (= knowledge exploitation). Therefore, we propose *Hypothesis 5a/b: KMS support the transformation (H5a) and the exploitation capability of a firm (5b) and thus contribute to knowledge utilization.*

RACAP as defined above refers to transformation and exploitation capabilities. Routines that "facilitate combining existing knowledge and the newly acquired and assimilated knowledge" (Zahra and George, 2002, p. 190) build the transformation capability. The exploitation capability involves routines that use and integrate knowledge in its daily operations (Zahra and George, 2002). Thus, reconfiguring and applying knowledge requires both capabilities of RACAP. Applying new knowledge or reconfiguring already existing knowledge results in new products or services which in turn "culminat[e] in innovation success" (Mitchell, 2006, p. 922). The transformation and exploitation of knowledge is thus a prerequisite to render an effect and we propose *Hypothesis 5c/d (H5c/d): Transformation (5c) and exploitation capability (5d) positively and directly influences innovation success.*

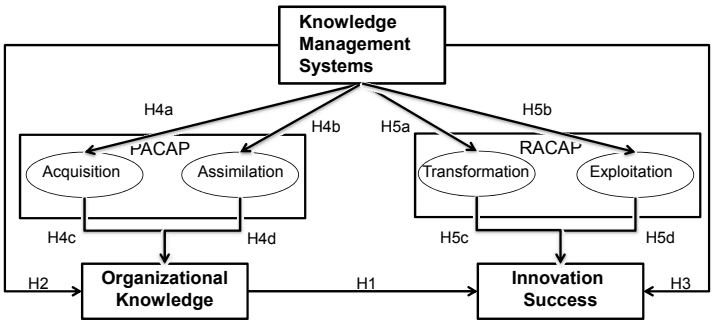


Figure 1. Research Model

Summing up, we propose that KMS support the transformation and exploitation capability of a firm which in turn are prerequisites for the innovation success. Thus, we combine hypotheses 5a-d and pro-

pose the overarching *Hypothesis 5 (H5): RACAP positively mediates the influence of knowledge management systems on innovation success*. Figure 1 shows the complete research model.

4 Methodology

We now test the research model using survey data from the German manufacturing industry (SIC codes 3011-3999). Within this industry, we identified the 2,500 largest firms (2007 revenues). We contacted each firm by phone to identify the manager in charge of the most important product division or, if such a position existed, the innovation manager, i.e. the person in charge of the innovation activities within this division. Then, the questionnaire was mailed out on paper, by email, or by fax according to the manager's preference. If the manager had not returned the completed questionnaire within 4 weeks, we sent a reminder letter, followed by a reminder call 2 weeks later. Eventually, we received 229 questionnaires, whereof 224 could be used for testing the model as they showed no missing data.

For developing the questionnaire instrument, we reviewed the measurement models from 139 related journal articles and finally used – where appropriate to our application domain – the most common reflective instruments for all of our model's constructs (cf. Table 2 in the appendix).

5 Results

5.1 Validating the measurement model

Testing the data on normality shows slight but significant deviations for some indicators which is one reason we used PLS for testing the model (applying smartPLS 2.0 M3 (Ringle et al., 2007)). For testing non-response bias, we first compared the early and late respondents (those who answered after a reminder call or after a repeatedly sent questionnaire (Armstrong et al., 1977)), and second, we compared demographic data (revenue and number of employees) of respondent vs. non-respondent firms. Both tests showed no significant group differences, so we do not assume non-response bias.

Testing a causal model with PLS requires that the reliability and validity of measuring the latent variables by multiple items is ensured. As recommended by Hulland (1999) the loading of each indicator should be higher than .707. Just one indicator missed this threshold, but its loading is higher than .6 as suggested by Bogazzi and Yi (1988). We examined convergent validity by using composite reliability and the Average Variance Extracted (AVE). Both requirements for composite reliability being above .7 (Nunnally, 1978) and AVE being above .5 (Chin, 1998) are met for all constructs (cf. Table 2 in the appendix). Furthermore, the square root of the AVE of every construct is greater than the intercorrelations with the other constructs (cf. Table 3 in the appendix) and the loadings of the items are higher than their correlations with any other construct (cf. Table 4 in the appendix), indicating sufficient discriminant validity.

5.2 Testing the structural model

Figure 2 shows the PLS test results including the R^2 and the path coefficients from testing our model which indicates that:

- KMS contribute strongly to all four capabilities of ACAP
- KMS do *not* directly contribute to organizational knowledge and to innovation success
- PACAP is a substantial determinant of organizational knowledge
- Organizational knowledge and RACAP are important determinants of innovation success but within the latter one only the exploitation capability is relevant.

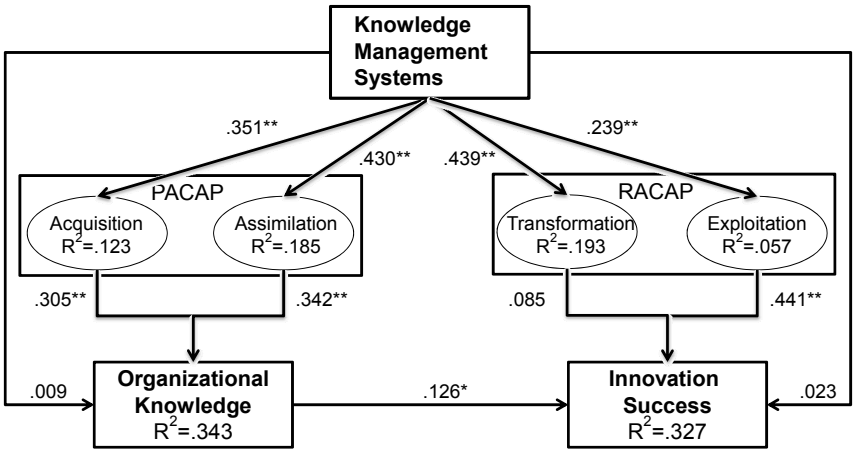


*Figure 2: PLS results (path coefficients with significance level) (**: p<.01, *: p<.05)*

Therefore, most of our hypotheses are confirmed; only the direct effects of KMS on organizational knowledge (H2) and on innovation success (H3) as well as the effect of transformation capability on innovation success (H5c) have to be falsified.

5.3 Testing the Mediation of ACAP

A two-step hierarchical procedure is performed to test the mediator role of PACAC and RACAP within our research model. First, we test a basic model which simply investigates the contribution of KMS to organizational knowledge (H2) and to innovation success (H3) (Model I). Second, we compare this model with the results from our origin research model (Model II) for evaluating the mediation effect of PACAP between KMS and organizational knowledge (H4) and of RACAP between KMS and innovations success (H5).

Table 1 shows the PLS test results from testing Models I and II (path coefficients and significance levels). Both models are calculated based on the same sample (n=224).

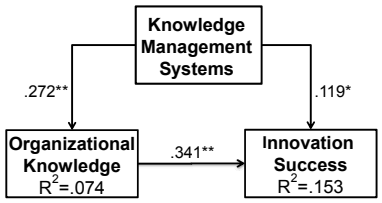
Model I	Path	Model I	Model II
	Organizational knowledge → Innov. success (H1)	.341**	.126*
	KMS → Tech. knowledge (H2)	.272**	.009
	KMS → Innovation success (H3)	.119*	.023
	KMS → Acquisition (H4a)		.351**
	KMS → Assimilation (H4b)		.430**
	Acquisition → Organizational knowledge (H4c)		.305**
	Assimilation → Organizational knowledge (H4d)		.342**
	KMS → Transformation (H5a)		.439**
	KMS → Exploitation (H5b)		.239**
	Transformation → Innovation Success (H5c)		.085
	Exploitation → Innovation Success (H5d)		.441**

*Table 1. PLS results (path coefficients with significance level) (**: p<.01, *: p<.05)*

The results show that KMS play an important role for achieving organizational knowledge (Model I: highly significant paths and R^2=.074) and contribute to innovation success (Model I: weakly significant path in Model I and R^2=.153), but that

- for effectively applying KMS to organizational knowledge, PACAP is required (increase of R^2 to .343). PACAP acts as a full mediator between KMS and organizational knowledge since the direct paths in model I become insignificant in model II.

- for effectively using KMS to increase innovation success, RACAP is needed: R^2 increases to .327 and RACAP acts as full mediator between KMS and innovation success since the direct paths in model I become insignificant in model II

Therefore, our mediation hypotheses regarding PACAP (H4) and RACAP (H5) are confirmed noting that for the latter only exploitation contributes to innovation success and that H5c has to be rejected.

5.4 Post-hoc Analyses on the Validity of the Results

The validity of our results was further analyzed by introducing different control variables to the PLS model in order to rule out rival hypotheses. We tested for firm size and considered it as a further determinant to all of the endogenous constructs in the PLS model (measured by log of revenue and number of employees in 2008). We found that firm size is positively related with exploitation and organizational knowledge but negatively with innovation success. Nevertheless, it does not change any of the tested theoretical relationships of our model. Also, there is no influence of environmental turbulence and firm strategy on the model relations but it shows some minor effects on the ACAP dimensions.

Finally, we tested the results regarding the presence of common method bias (CMB) (Podsakoff et al., 2003). We had added marker variables to the questionnaire, which are theoretically unrelated to the model constructs. By adding them as further determinants of each endogenous construct ("Common Method Factor" as proposed in Podsakoff et al. (2003)), we can partial out at least that part of the correlations which is directly related to using the same data collection instrument and scales; thus we can get indications whether CMB is a major problem in the data. The analysis revealed that neither model path coefficients nor R^2 are affected.

One limitation of our approach is that we have used a single person for capturing the organizational perspective. We addressed this limitation by gathering the relevant variables from the expert responsible for the innovation process (Tallon et al. 2000) and by comparing the view of the respondent managers with the view of other managers who have been contacted within a case study series before the survey. We found no major deviations between the assessments of these two kinds of groups.

6 Discussion and Conclusion

Drawing on the literature on ACAP we propose a model of organizational innovativeness which analyzes the effect of a firm's use of KMS on the ACAP and thus on the innovation success of a firm.

The analyses show that KMS exhibit a significant impact on innovation success, absorptive capacity, and organizational knowledge underlining the importance of KMS in the firm's innovation process. The results suggest that future studies on ACAP should explicitly address KMS as absorptive capacity "depends on the organization's ability to share knowledge and communicate internally" (Lane et al., 2006, p. 838). Our study shows how KMS can contribute to this ability. Case studies[1] accompanying this study show that one application area of KMS is the search for information by supporting the identification of knowledge sources. Similarly, the use of KMS provides a more complete picture of and grants access to newly acquired knowledge by supporting the combination of different pieces of information. Accordingly, our results show a significant effect of KMS on the two PACAP capabilities.

As part of RACAP, the transformation capability refers to combining existing and newly acquired knowledge which, for instance, is carried out in new product development projects. During those projects, KMS is typically used to archive knowledge learned during development and to extract information that helps to find links to existing knowledge from other projects and sources. Accordingly, we

[1] Case studies have been carried out before the survey started and served to get deeper insights into the generation and implementation of innovations. Thus the case studies contain information about the relationship of our models constructs.

found a strong link between KMS and the transformation capability. By contrast, the weakest effect of KMS was found regarding the exploitation capability. One reason might be that exploitation is about harvesting what has been developed before. Drawing on our case studies, harvesting typically involves the introduction of newly developed products into "regular" production and launching the product at the market. In contrast to transformation, encompassing lots of tests e.g. within the R&D function and within production (regarding "pilot" production) and involving cross-functional teams typically consisting of R&D, marketing/sales and production personnel, during exploitation KMS is used to a far lesser degree. Our case studies show that the frequency of new insights during this step is far lower than during the development phase. Often these insights are triggered by problems that are addressed by corrective measures. Thus, problems are solved quickly with no or only superficial documentation.

From an innovation research perspective, the results show that KMS are important drivers of innovativeness (strong and significant total effect); but for effectively applying KMS to organizational knowledge, PACAP is required while for effectively using KMS to increase innovation success, RACAP is needed. This has implications for the design of the knowledge management process in general and the goals and governance of the KMS in particular. For KM research, the analyses show the need to explicitly consider KMS as determinant since they have a substantial impact on all dimensions of ACAP (acquisition, assimilation, transformation, and exploitation), organizational knowledge, and innovation success.

References

Alavi, M. and Leidner, D.E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. MIS Quarterly, 25 (1), 107-136.

Alavi, M. and Tiwana, A. (2002). Knowledge Integration in Virtual Teams: The Potential Role of Kms. Journal of the American Society for Information Science and Technology, 53 (12), 1029-1037.

Argote, L., McEvily, B., and Reagans, R. (2003a). Introduction to the Special Issue on Managing Knowledge in Organizations: Creating, Retaining, and Transferring Knowledge. Management Science, 49 (4), v-viii.

Argote, L., McEvily, B., and Reagans, R. (2003b). Managing Knowledge in Organizations: An Integrative Framework and Review of Emerging Themes. Management Science, 49 (4), 571-582.

Armstrong, J.S. and Overton, T.S. (1977). Estimating Nonresponse Bias in Mail Surveys. Journal of Marketing Research, 14 396-402.

Bagozzi, R.P. and Yi, Y. (1988). On the Evaluation of Structural Equation Models. Journal of the Academy of Marketing Science, 16 (1), 74-94.

Bell, G.G. and Zaheer, A. (2007). Geography, Networks, and Knowledge Flows. Organization Science, 18 (6), 955-972.

Byrd, T.A. and Turner, D.E. (2001). An Exploratory Examination of the Relationship between It Infrastructure and Competitive Advantage. Information & Management, 39 (1), 41-52.

Chen, A.N.K. and Edgington, T.M. (2005). Assesing Value in Organizational Knoweldge Creation: Considerations from Knoweldge Workers. MIS Quarterly, 29 (2), 279-309.

Chin, W.W. (1998). Issues and Opinion on Structural Equation Modeling. MIS Quarterly, 22 (1),

Cohen, W.M. and Levinthal, D.A. (1990). Absorptive Capacity: A New Perspective on Learning & Innovation. Administrative Science Quarterly, 35 (1), 128-152.

Coombs, R. and Hull, R. (1998). Knowledge Management Practices' and Path-Dependency in Innovation. Research Policy, 27 (3), 237-253.

Cummings, J. and Kiesler, S. (2003). Coordination and Success in Multidisciplinary Scientific Collaborations. In Proceedings of the 24th International Conference on Information Systems (ICIS), Seattle, Washington, USA.

Damanpour, F. and Wischnevsky, J.D. (2006). Research on Innovation in Organizations: Distinguishing Innovation-Generating from Innovation-Adopting Organizations. Journal of Engineering and Technology Management, 23 269-291.

Darr, E.D., Argote, L., and Epple, D. (1995). The Acquisition, Transfer, and Depreciation of Knowledge in Service Organizations: Productivity in Franchises. Management Science, 41 (11), 1750-1762.
Denrell, J., Arvidsson, N., and Zander, U. (2004). Managing Knowledge in the Dark: An Empirical Study of the Reliability of Capability Evaluations. Management Science, 50 (11), 1491-1503.
Garcia-Morales, V.J., Ruiz-Moreno, A., and Llorens-Montes, F.J. (2007). Effects of Technology Absorptive Capacity and Technology Proactivity on Organizational Learning, Innovation and Performance: An Empirical Examination. Technology Analysis & Strategic Management, 25 (4),
Gold, A.H., Malhotra, A., and Segars, A.H. (2001). Knowledge Management: An Organizational Capabilities Perspective. Journal of Management Information Systems, 18 (1), 185-214.
Gosain, S., Malhotra, A., and El Sawy, O.A. (2004). Coordinating for Flexibility in E-Business Supply Chains. Journal of Management Information Systems, 21 (3), 7-45.
Grant, R.M. (1996). Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration. Organization Science, 7 (4), 375-387.
Hidalgo, A. and Albors, J. (2008). Innovation Management Techniques and Tools: A Review from Theory and Practice. R&D Management, 38 (2), 113-127.
Hulland, J. (1999). Use of Partial Least Squares (Pls) in Strategic Management Research. A Review of Four Recent Studies. Strategic Management Journal, 20 (2), 195-204.
Jansen, J.J.P., Van Den Bosch, F.A.J., and Volberda, H.W. (2005). Managing Potential and Realized Absorptive Capacity: How Do Organizational Antecedents Matter? Academy of Management Journal, 48 (6), 999-1015.
Jaworski, B.J. and Kohli, A.K. (1993). Market Orientation: Antecedents and Consequences. Journal of Marketing, 57 (3), 53.
Joshi, K.D., Lei, C., Datta, A., and Shu, H. (2010). Changing the Competitive Landscape: Continuous Innovation through It-Enabled Knowledge Capabilities. Information Systems Research, 21 (3), 472-495.
Ko, D.-G., Kirsch, L.J., and King, W.R. (2005). Antecedents of Knowledge Transfer from Consultants to Clients in Enterprise System Implementations. MIS Quarterly, 29 (1), 59-85.
Kogut, B. and Zander, U. (1992). Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. Organization Science, 3 (3), 383-397.
Kulkarni, U.R., Ravindran, S., and Freeze, R. (2006). A Knowledge Management Success Model: Theoretical Development and Empirical Validation. Journal of Management Information Systems, 23 (3), 309-347.
Lane, P.J., Koka, B.R., and Pathak, S. (2006). The Reification of Absorptive Capacity: A Critical Review and Rejuvenation of the Construct. Academy of Management Review, 31 (4), 833-863.
Lane, P.J., Salk, J.E., and Lyles, M.A. (2001). Absorptive Capacity, Learning, and Performance in International Joint Ventures. Strategic Management Journal, 22 (12), 1139-1161.
Lenox, M. and King, A. (2004). Prospects for Developing Absorptive Capacity through Internal Information Provision. Strategic Management Journal, 25 331-345.
Liao, S.-h., Fei, W.-C., and Chen, C.-C. (2007). Knowledge Sharing, Absorptive Capacity, and Innovation Capability: An Empirical Study of Taiwan's Knowledge Intensive Industries. Journal of Information Science, 33 (3), 340-359.
Lichtenthaler, U. (2009). Absorptive Capacity, Environmental Turbulence, and the Complementarity of Organizational Learning Processes. Academy of Management Journal, 52 (4), 822-846.
Matusik, S.F. and Heeley, M.B. (2005). Absorptive Capacity in the Software Industry: Identifying Dimensions That Affect Knowledge and Knowledge Creation Activities. Journal of Management, 31 (4), 549-572.
Mitchell, V.L. (2006). Knowledge Integration and Information Technology Project Performance. MIS Quarterly, 30 (4), 919-939.
Nahapiet, J. and Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. Academy of Management Review, 23 (2), 242-266.
Nelson, R.R. and Winter, S.G. (1982). An Evolutionary Theory of Economic Change. The Belknap Press of Harvard University Press, Cambridge (Mass.).

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. Organization Science, 5 (1), 14-37.
Nunnally, J.C. (1978). Psychometric Theory. McGraw Hill, New York (NY).
Pavlou, P.A. and El Sawy, O.A. (2006). From It Leveraging Competence to Competitive Advantage in Turbulent Environments: The Case of New Product Development. Information Systems Research, 17 (3), 198-227.
Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., and Podsakoff, N. (2003). Common Method Biases in Bevioral Research: A Critical Review of the Literature and Recommended Remedies. Journal of Applied Psychology, 88 (5), 879-903.
Randall, D., Hughes, J., O'Brien, J., Rouncefield, M., and Tolmie, P. (2001). Memories Are Made of This': Explicating Organisational Knowledge and Memory. European Journal of Information Systems, 10 (2), 113-121.
Ringle, C.M., Wende, S., and Will, A. (2007). Smartpls 2.0 M3 (Beta).
Schumpeter, J.A. (1934). Theory of Economic Development. Harvard University Press, Cambridge, MA.
Spender, J.-C. (1996). Making Knowledge the Basis of a Dynamic Theory of the Firm. Strategic Management Journal, 17 (Special Issue: Knowledge and the Firm), 45-62.
Srinivasan, R., Lilien, G.L., and Rangaswamy, A. (2002). Technological Opportunism and Radical Technology Adoption: An Application to E-Business. Journal of Marketing, 66 (3), 47-60.
Subramaniam, M. and Youndt, M.A. (2005). The Influence of Intellectual Capital on the Types of Innovative Capabilities. Academy of Management Journal, 48 (3), 450-463.
Tsai, W. (2001). Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance. Academy of Management Journal, 44 (5), 996-1004.
Tsoukas, H. and Vladimirou, E. (2001). What Is Organizational Knowledge? Journal of Management Studies, 38 (7), 973-993.
Van den Bosch, F.A.J., Volberda, H.W., and Boer, M.d. (1999). Co-Evolution of Firm Absorptive Capacity and Knowledge Environment: Organizational Forms and Combinative Capabilities. Organization Science, 10 (5), 551-568.
Zahra, S.A. and George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. Academy of Management Review, 27 (2), 185-203.

Empirical Appendix

Variable	Label	Indicator	Loading	Sources	AVE	CR
Innovation success	IS1	Compared to others in our industry, our product division launches more new product/services.	.901	a	.826	.905
	IS2	Compared to others in our industry, our product division identifies and develops new markets considerably faster.	.917			
Organiza-tio-nal knowledge	OK1	Our product division has very high knowledge about state-of-the-art technologies practices relevant for us.	.813	b,c	.756	.925
	OK2	Our product division has very high knowledge about implementing new technologies.	.907			
	OK3	Our product division has the necessary skills to implement new acquired technological knowledge.	.890	d		
	OK4	Our product division has considerable competences in utilizing new technologies.	.870			
Knowledge management systems	KMS1	Our firm uses a knowledge management system for archiving and reus-ing of knowledge.	.800	e	.665	.856
	KMS2	All product divisions use a common knowledge managements system.	.852	f		
	KMS3	Our IT infrastructure supports an effective information exchange signif-icantly.	.793	g		
RACAP - Exploitation	EXP1	Our product division has a significantly better capability in R&D of new products or services than comparable product division of our competi-tors.	.815	h	.600	.854
	EXP2	Our product division has better capabilities in developing novel skills for transforming old products into new ones.	.795			

	EXP3	Our product division often tries different operation procedures and new technologies.	.719			
	EXP4	We are completely content with the innovative management of the product division.	.750			
RACAP – Transform-ation	TRA1	Within the product division we systematically consider how to better exploit knowledge.	.836	i	.661	.853
	TRA2	Our product division regularly considers the consequences of changing market requirements in terms of new products and services.	.862			
	TRA3	Our product division constantly discusses consequences of market trends and resulting potentials for new product development.	.735			
PACAP - Assimilation	ASS1	Our co-workers know very exactly know the most important of en-hancements of our products, expressed by customers, as well as known problems in the usage of the product.	.683	j	.600	.814
	ASS2	In our firm exists a very high understanding about which information when and where are needed to achieve an outstanding result.	.796	k		
	ASS3	Our product division very fast recognizes the usefulness new knowledge.	.828	i		
PACAP - Acquisition	ACQ1	Our product division has very high potential to absorb relevant knowledge of external sources.	.787	c	.683	.866
	ACQ2	Our product division has very high competencies to get new technologi-cal knowledge into the firm.	.896			
	ACQ3	Our product division is able to identify knowledge of interest to other product divisions and to forward it to these divisions.	.793	l		
Items were originally in German and have been measured by a 7-Point-Likert-Scale, ranging from 1 (totally agree) to 7 (totally disagree)						
Items are adopted and adapted to our research domain from: (a) (Srinivasan et al., 2002); (b) (Matusik et al., 2005); (c) (Ko et al., 2005); (d) (Garcia-Morales et al., 2007); (e) (Pavlou et al., 2006); (f) (Kulkarni et al., 2006); (g) (Byrd et al., 2001); (h) (Liao et al., 2007); (i) (Jansen et al., 2005); (j) (Jaworski et al., 1993); (k) (Gosain et al., 2004); (l) (Denrell et al., 2004)						

Table 2. Construct specifications, item loadings, Average Variance Extracted (AVE), and the composite reliability (CR)

	Innovation Success	KMS	Assimilation	Acquisition	Transformation	Exploitation	Organizational Knowledge
Innovation Success	.909						
KMS	.199	.815					
Assimilation	.363	.430	.772				
Acquisition	.286	.351	.612	.827			
Transformation	.412	.439	.722	.609	.813		
Exploitation	.549	.239	.472	.501	.570	.772	
Techn.Knowl.	.365	.263	.533	.519	.515	.429	.870

Table 3. Latent variable correlations with square root of AVE in shaded cells

	Innovation success	Organizational knowledge	KMS	Exploitation	Transformation	Assimimlation	Acquisition
IS1	.901	.301	.134	.493	.310	.270	.278
IS1	.917	.360	.223	.505	.433	.385	.244
OK1	.339	.813	.175	.296	.376	.393	.356
OK2	.339	.907	.249	.427	.437	.460	.458
OK3	.290	.890	.202	.319	.453	.487	.485
OK4	.306	.870	.281	.440	.516	.503	.491
KMS1	.252	.244	.800	.286	.384	.373	.270
KMS2	.113	.149	.852	.150	.355	.335	.293
KMS3	.102	.243	.793	.130	.327	.336	.297
EXP1	.486	.248	.151	.815	.395	.312	.367
EXP2	.408	.308	.145	.795	.381	.281	.333
EXP3	.273	.288	.157	.719	.377	.302	.368
EXP4	.471	.457	.267	.750	.572	.513	.463
TRA1	.304	.413	.448	.500	.836	.602	.505
TRA2	.413	.422	.338	.446	.862	.636	.555
TRA3	.278	.433	.265	.449	.735	.514	.410
ASS1	.139	.397	.247	.204	.394	.683	.330
ASS2	.361	.406	.359	.408	.548	.796	.476
ASS3	.321	.432	.378	.455	.703	.828	.589
ACQ1	.168	.332	.217	.351	.406	.371	.787
ACQ2	.250	.502	.338	.479	.563	.571	.896
ACQ3	.278	.425	.297	.395	.518	.545	.793

Table 4. Cross-loadings of manifest variables